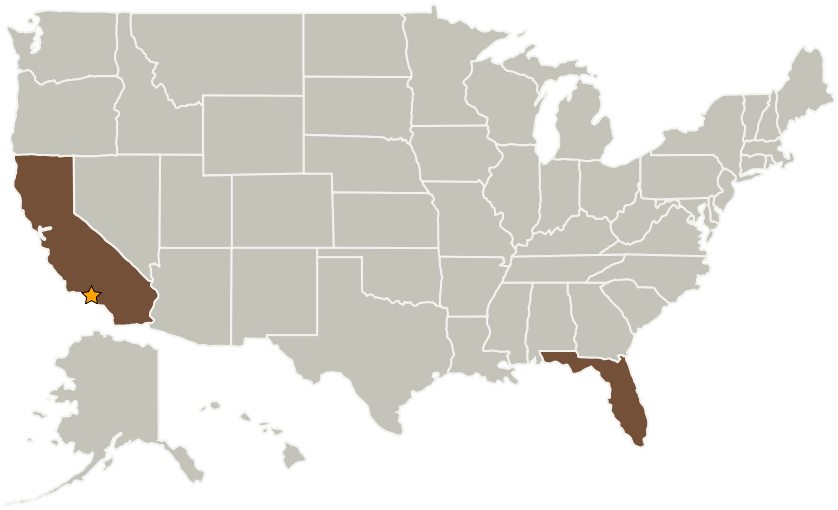
Lightweight and Energy Efficient Heat Pump, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

Future Spacecraft and instruments for NASA's Science Mission Directorate will require increasingly sophisticated thermal control technology. A need exists for efficient, lightweight Vapor Compression Cycle (VCC) systems, for medium-to-low cooling loads (i.e. less than 2 kW). While conventional VCC technology is relatively compact and efficient for multi-kW loads, it is difficult to find a system that strikes a balance between coefficient of performance, weight and size within the sub-kW range. The particular system proposed will be a highly efficient Mini-VCC featuring custom compressor and heat-exchanger technology. The compressor is a highly efficient, high power density rotary compressor designed for 500 W of heat removal with a Coefficient of Performance (COP) of 3. In the Phase I effort Rini Technologies Inc. (RTI) proposes to develop a compressor capable of handling variable heat loads up to 500 W, with variable temperature lift capability to suit NASA's specific needs. Detailed component testing will be performed, and the results coupled with NASA's specific needs will result in a complete system recommendation for a Phase II effort. The following Phase II effort will result in delivery of an efficient, lightweight, reliable and compact prototype VCC for NASA missions.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Rini Technologies, Inc.	Supporting Organization	Industry	Orlando, Florida

Primary U.S. Work Locations	
California	Florida

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors